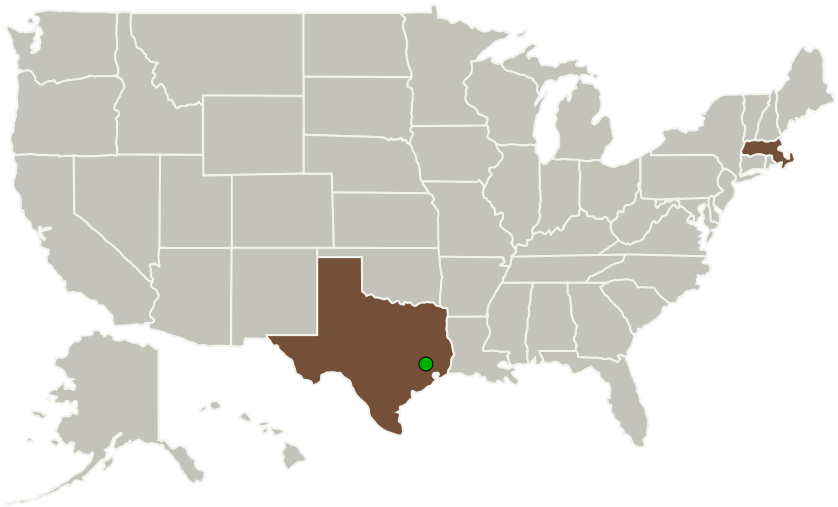
Wearable Personal Hydrazine Monitoring System, Phase I

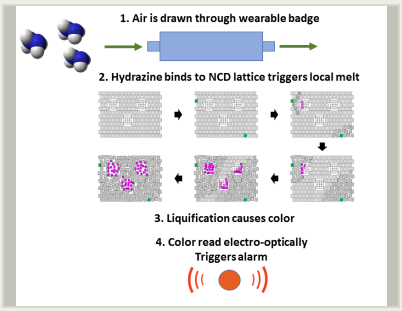
Completed Technology Project (2017 - 2017)

Project Introduction

We propose to develop a rapid, high sensitivity, personal monitoring device for hydrazine that is based upon the Surface Triggering of Propagated Crystal Lattice Destabilization (STPCLD) phenomenon. This represents a novel approach to rapid, high sensitivity sensors and is based upon noncovalent derivatization (NCD). The sensor will consist of a two-dimensional cocrystal film of a hydrazine-interacting molecule and a color-forming molecule. When bound within the crystal, the color-former is not colored, but when the crystal liquefies, the color-former takes on color. The uncolored crystal is maintained just below its phase transition temperature. When hydrazine interacts with one of the hydrazine-interacting molecules, it causes a defect in the two-dimensional lattice. Because the composition is chosen near the crystal melting temperature, the crystal is entropically poised to melt. A local liquefication occurs, which spreads rapidly along crystal dislocations. The specific objectives are: 1. To synthesize and prepare a set of bis-phthalimide derivatives for testing as hydrazine-interactive substrates. 2. To test the set of bis-phthalimide derivatives as hydrazine-interactive substrates for hydrazine induced melting. a. To determine the best substrate. b. To determine the ideal operating temperature. c. To determine the sensitivity to hydrazine and ammonia. 3. To design Phase II configuration.

Primary U.S. Work Locations and Key Partners





Wearable Personal Hydrazine Monitoring System, Phase I Briefing Chart Image

Table of Contents

Wearable Personal Hydrazine Monitoring System, Phase I

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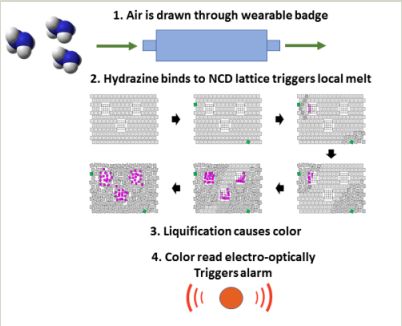
Organizations Performing Work	Role	Type	Location
Warner Babcock Institute for Green Chemistry	Lead Organization	Industry	Wilmington, Massachusetts
Johnson Space Center(JSC)	Supporting Organization	NASA Center	Houston, Texas

Primary U.S. Work Locations	
Massachusetts	Texas

Images



Briefing Chart Image
Wearable Personal Hydrazine Monitoring System, Phase I Briefing Chart Image
(https://techport.nasa.gov/image/127585)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Warner Babcock Institute for Green Chemistry

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

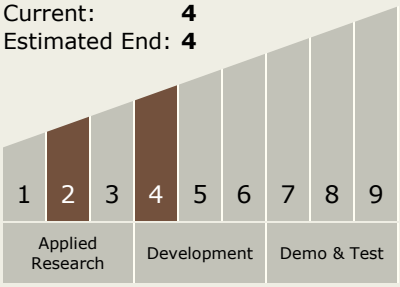
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
David Wolf

Technology Maturity (TRL)

Start: **2**
Current: **4**
Estimated End: **4**



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Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - TX06.4 Environmental Monitoring, Safety, and Emergency Response
    - TX06.4.1 Sensors: Air, Water, Microbial, and Acoustic

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System